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13. ABSTRACT

Provides background information relative to testing of armament and individual weapons. Applicable to Volume 3, TOPs. Identifies cognizant agencies and offices. Discusses environmental testing, test plans, safety during testing, and acceptance test requirements.

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TESTING ARMAMENT AND INDIVIDUAL WEAPONS

		Paragraph	Page
Section I.	GENERAL		
	Purpose and Scope	1	1
	Basic Information	2	1
II.	TECHNICAL PRESENTATION		
	Cognizant Agencies and Offices . .	3	2
	Environmental Testing	4	3
	Test Plans	5	5
	Safety During Testing	6	5
	Acceptance Test Procedures	7	7
APPENDIX.	REFERENCES		8

SECTION I
GENERAL

1. Purpose and Scope. This TOP serves as an introduction to TOP Volume III. It lists the principal Army agencies concerned with the testing of armament and individual weapons and discusses or lists the policies and documents governing the testing.

2. Basic Information. Volume III of the TOP covers the testing of individual weapons and ground, vehicular, and aircraft armament used by the Army. Included are hand arms, shotguns, rifles, submachine guns, grenade launchers, and shoulder-fired, light machine guns; automatic weapons, automatic grenade launchers, mine dispensers, rocket launchers, missile launchers and guidance systems, air defense weapons (except rockets), mortars, recoilless weapons; and tank artillery, self-propelled artillery, and other vehicular armament.

The test phases for each type of weapon are outlined in the applicable system TOP of Volume III. Before referring to Volume III, however, the test director should be familiar with the background information given herein.

SECTION II
TECHNICAL PRESENTATION

3. Cognizant Agencies and Offices. The principal agencies and offices concerned with the testing of armament and individual weapons, and their involvement, are:

a. USACDC (Combat Developments Command) Headquarters, Fort Belvoir, Virginia, together with the following USACDC commodity agencies, responsible for Materiel Needs (MN's):

(1) Armor Agency, Fort Knox, Kentucky.

(2) Aviation Agency, Fort Rucker, Alabama.

(3) Air Defense Agency, Fort Bliss, Texas.

(4) Field Artillery Agency, Fort Sill, Oklahoma.

(5) Infantry Agency, Fort Benning, Georgia.

(6) Missile and Munitions Division, Maintenance Agency, Redstone Arsenal, Alabama.

(7) Maintenance Agency, Aberdeen Proving Ground, Md. (maintenance & reliability)

b. Project Managers, AMC (Army Materiel Command): Specific project managers are assigned to direct and manage the funding, development, and procurement of specific armament and individual weapons.

c. WECOM (Weapons Command), Rock Island, Illinois: Responsible to AMC or AMC project managers for the actual development and procurement of specific individual weapons, helicopter armament, and armament other than rocket and missile launchers and mine dispensers.

d. MICOM (Missile Command), Redstone Arsenal, Alabama: Same as WECOM except that rocket and missile launchers are involved.

e. MUCOM (Munitions Command), Dover, New Jersey: Same as WECOM except that rocket launchers and mine dispensers are involved.

f. TACOM (Tank-Automotive Command), Warren, Michigan: Same as WECOM except that combat vehicles, armament systems other than the weapon, and weapon ancillary equipment are involved.

g. AVSCOM (Aviation Systems Command), St. Louis, Missouri: Same as WECOM except that aircraft, drones, external stores, and ground support equipment are involved. Also responsible for integration of armament with aircraft and safety of flight of the aircraft.

h. TECOM (Test and Evaluation Command) Headquarters, Materiel Testing Directorates as follows, responsible for the testing of the materiel indicated:

(1) Armor: Armament for combat vehicles.

(2) Air Defense: Air defense weapons.

(3) Infantry: Small arms, recoilless rifles, mortars, grenade launchers, mine dispensers.

i. Aberdeen Proving Ground, Maryland: Principal engineering test (ET) agency for testing armament.

j. Yuma Proving Ground, Yuma, Arizona: Primarily responsible for desert field environmental tests; secondary ET agency for armament.

k. Jefferson Proving Ground, Madison, Indiana: Tertiary ET agency for armament.

l. Arctic Test Center, Fort Greely, Alaska: Responsible for arctic field environmental tests.

m. Tropic Test Center, Panama Canal Zone: Responsible for tropic field environmental phases of various engineering and/or expanced service tests of armament.

n. Armor and Engineer Board, Fort Knox: Responsible for expanded tests (ST) of complete tank weapon systems.

o. Infantry Board, Fort Benning: Responsible for expanded service test of infantry weapons (and ammunition).

p. Artillery Board, Fort Sill: Responsible for expanded service test of field artillery, including self-propelled and towed.

q. Air Defense Board, Fort Bliss: Responsible for expanded service test of air defense weapons.

4. Environmental Testing. Environmental tests are conducted to determine whether an item will perform effectively in the environments of its intended use. The most important policies regarding environmental testing of armament and individual weapons, including those in AR 70-38, are:

a. All Army equipment is required to perform effectively in the wet-warm, wet-hot, intermediate hot-dry, and intermediate cold climatic categories of AR 70-38. Other required climatic categories are delineated in MN's.

b. Because the testing of materiel in adverse natural environments, such as arctic, desert, jungle, seashore, and mountains, is costly in terms of manpower, money, materiel, and time, the maximum amount of testing is performed in climatic chambers that simulate the adverse environments.

Environmental testing of armament is conducted in part during the various development phases. In the earliest stages, the design agency may conduct tests to verify that certain components can perform adequately under the climatic extremes, or it may request that the tests be performed by TECOM. This will usually occur during the engineer design test (EDT).

Upon receipt of the prototype for engineering testing, the ET agency will perform all environmental tests required by the MN that are within the capabilities of its environmental chambers. The ET agency will utilize all of the data from earlier testing conducted by TECOM agencies sponsored by the design agency, provided that data results are usable and no modifications have been made that will affect test results. Though the design agency may resort to certain overtests, it is the policy of the ET agency to confine testing to simulation of the conditions specified in AR 70-38 insofar as possible. Standard chamber testing of armament and individual weapons involves high temperature, low temperature, solar radiation, sand and dust, salt spray, and high humidity. Salt water immersion and mud tests are also conducted. Improvised tests involving wind and rain are possible within limitations. Fungus tests are performed for TECOM by Frankford Arsenal, Edgewood Arsenal, or White Sands Missile Range.

The importance of climatic tests in chambers cannot be overstated: besides the economic advantages, as stated above, chamber testing provides the extreme conditions that are desired but seldom found at the climatic test sites. In conducting environmental tests it must be remembered that AR 70-38 defines climatic conditions, not test procedures. For test procedures, first choice will be those that are specially devised and described in TOP's/MTP's; otherwise, MIL-STD-810B will be the document used most by the ET agency. The ET agency confines its environmental testing to climatic chambers and those natural environments which it is convenient to utilize.

The climatic test agencies (Yuma Proving Ground, Arctic Test Center, and Tropic Test Center) write the test plans for the field environmental tests that they conduct at their specialized sites.

Environmental testing of armament includes testing under adverse conditions not related to the weather; namely, transportation-vibration, rough handling, and radio-frequency radiation.

5. Test Plans. Test plans will include subtests from volume III of the TOP required to evaluate the test item in compliance with stated objectives even though test data are to be obtained from other sources (e.g., EDT, field use, etc.).

In TOP volume III the approach to writing the test plan is to first refer to the appropriate system test pamphlet for the type of item that is to be tested (e.g., TOP 3-2-050, Mortars; 3-2-059, Hand and Shoulder Weapons). This system TOP in turn lists the common TOP's and other documents suitable for use in testing and evaluating the item.

Test plans are submitted by the test agency to TECOM Headquarters for approval.

Local guidance for writing test plans may exist: e.g., MTD Procedure 70-17.

6. Safety During Testing. Safety is paramount in all DOD test operations. MIL-STD-882 states:

> "...all tests shall be reviewed to insure that:
>
> (a) Safety is adequately demonstrated.
>
> (b) The testing will be carried out in a safe manner.
>
> (c) All additional hazards introduced by testing procedures, instrumentation, test hardware, etc., are properly identified and minimized."

AMC implements DOD and DA policy on safety during testing through two major regulations: AMCR 385-12 (implemented, in turn, by TECR 385-6) which establishes provisions for life cycle verification of materiel safety, and AMCR 385-100 which prescribes the general safety rules of AMC and AMC major subordinate commands. Local testing installations publish separate safety manuals and regulations to parallel the AMC publications with respect to their specific safety missions, range facilities, and testing sites.

Within the overall scheme of development and testing, four documents are developed pertinent to safety; namely:

a. Safety Statement. This document is a summary of the data collected and evaluated during design and development phases and available prior to the ET. It expresses the considered opinion of the developing agency regarding the hazards and safety limitations that may be presented by the materiel, together with recommended actions to minimize these hazards and to reduce the exposure of personnel. The safety statement must be furnished to the ET agency (or obtained by the test director) before testing begins. (An interim safety statement may be made available for the conduct of an EDT.)

b. Standing Operating Procedure (SOP). AMCR 385-100 states: "Prior to starting any operation involving ammunition, explosives, or other hazardous operation, an adequate standing operating procedure shall be developed and then approved by the Commanding Officer of the establishment or by a qualified member of his staff who has been delegated the responsibility for review of and authority for approval of standing operating procedures." Each test agency maintains its own file of SOP's. Before conducting a test the test director must be sure than an SOP to provide safety during the testing of a particular item has been written and approved, studied by himself and others who will participate on the range, and posted on the range; then adhered to throughout all test operations.

Test planning is done in a manner that permits minimum hazard testing (i.e., using completely inert-loaded projectiles or inert-loaded projectiles with spotting charges) when test objectives can be met in that manner. Personnel take cover during firing until the safety of the item has been ascertained, and even after that they are exposed only when test objectives so require. The provisions of AMCR 385-100 apply to the safety of all testing.

SOP's for a hazardous operation are usually written with a broad, general scope to permit application to many situations. An SOP covering, for example, the firing of weapons fits this category. These SOP's are permanent documents which are amended by supplements and changes and periodically updated. SOP's or supplements are prepared for specific tests of individual items whenever general SOP's do not apply. These are usually transitory documents that are rescinded when no longer needed.

c. Safety Release. The safety release is a statement issued by TECOM, in accordance with TECR 385-6, which stipulates that a specific item is safe for the EST based upon the results of the safety evaluation performed by the ET agency during the early portion of the ET. The safety evaluation consists of appropriate design studies and tests such as shock, vibration, performance, and climatic tests. The safety release will express specific hazards that exist, operational limitations, and actions that may be necessary to reduce the hazards and exposure of personnel during the ST. (An interim safety release, which is issued for concurrent or integrated ET's and EST's, is a preliminary or provisional document based on the developer's safety statement.)

d. Safety Confirmation. This is a consolidation of all safety information issued at the conclusion of the EST in accordance with TECR 385-6. It indicates the degree to which the item meets any safety requirements in the guidance document and recommends limitations, precautions, and warnings necessary for the safety of user personnel.

7. Acceptance Test Procedures. Acceptance Test Procedures (ATP's) are written to clarify, and to standardize interpretations of, procurement documents in order to achieve uniformity in acceptance testing among the agencies concerned. ATP's summarize the applicable sections of procurement specifications and outline techniques to be employed in the acceptance testing of ammunition and armament, including armor. For testing techniques not specified in the procurement documents TOP/MTP methods are followed.

When appropriate, a general ATP is written for a common type, or family, of items with supplements prepared for each item in the group. For example, a general ATP covers acceptance testing of artillery cannon; supplements cover specific types and models of cannon.

The agency performing the acceptance test initiates a new or revised ATP when a suitable one is not available (TECR 700-9); responsibility for staffing and publishing is assigned to Aberdeen Proving Ground.

Recommended changes to this publication should be forwarded to Commanding General, U. S. Army Test and Evaluation Command, ATTN: AMSTE-ME, Aberdeen Proving Ground, Maryland 21005. Technical information related to this publication may be obtained from the preparing activity: Commanding Officer, Aberdeen Proving Ground, ATTN: STEAP-MT-M, Aberdeen Proving Ground, Maryland 21005. Additional copies of this document are available from the Defense Documentation Center, Cameron Station, Alexandria, Virginia 22314. This document is identified by the accession number (AD No.) printed on the first page.

APPENDIX

REFERENCES

1. AR 70-10, "Test and Evaluation During Development and Acquisition of Materiel," 9 February 1971.

2. AR 70-38, "Research, Development, Test, and Evaluation of Materiel for Extreme Climatic Conditions."

3. AR 71-3, "User Field Tests, Experiments and Evaluation."

4. AR 310-25, "Dictionary of United States Army Terms."

5. DA Pam 11-25, "Life Cycle Management Model for Army Systems."

6. AMCR 385-12, "Life Cycle Verification of Safety."

7. AMCR 385-100, "Safety Manual."

8. AMC Suppl 1 to AR 70-10, "Test and Evaluation During Research and Development of Materiel," 18 August 1970.

9. MIL-STD-810B, "Environmental Test Methods."

10. MIL-STD-882, "System Safety Program for Systems and Associated Subsystems and Equipment: Requirements For."

11. TECR's:

    a. 10-18, "Mission and Major Functions of the Aberdeen Proving Ground, Aberdeen Proving Ground, Md."

    b. 70-8, "Test Resource Management System (TRMS)."

    c. 70-9, "Test Priorities."

    d. 70-11, "Research and Development of Instrumentation."

    e. 70-12, "TECOM Test Methodology Research Investigations."

    f. 70-23, "Equipment Performance Reports (EPR's)."

    g. 70-24, "Documenting Test Plans and Reports."

    h. 385-6, "Verification of Safety of Materiel During Testing."

    i. 700-1, "Value Engineering."

    j. 700-5, "Instrumentation Master Plan."

k. 700-9, "Logistics - Production and Post Production Testing of Ammunition."

12. MTD Procedures (Aberdeen Proving Ground):

a. 70-6, "Preparation and Distribution of Technical Reports."

b. 70-17, "Policy, Responsibility and Procedures for Test Plans."

c. 210-2, "Technical Testing Resources."

d. 310-8, "Processing of TOP's."

e. 700-9, "Research and Development of Instrumentation."

f. 728-6, "Value Engineering and Cost Reduction."

g. 728-29, "Test Methodology Research Investigations."